Treatment of skin and soft tissue infections

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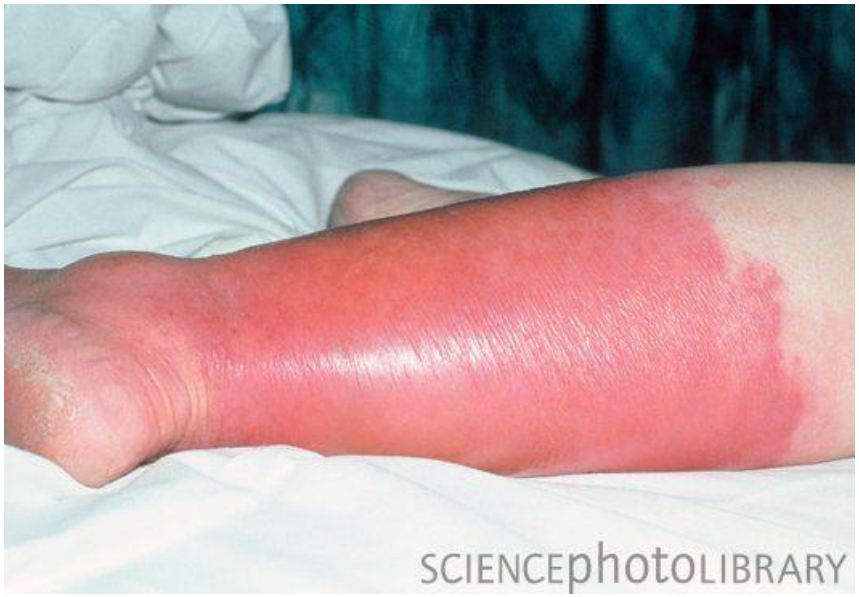
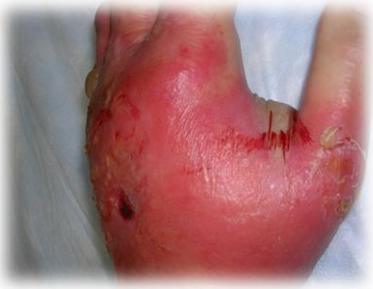
המרכז הרפואי הלל-יפה- חדרה

2019

Objectives

- To understand the definition of cellulitis
- To know what treatment is appropriate
- To know when hospitalization is needed



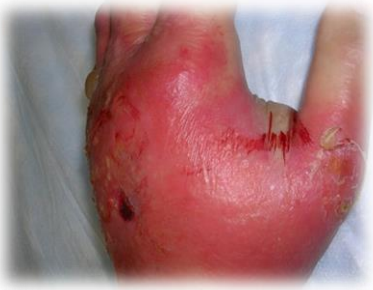


הקדמה

- אבחנה מוקדמת של זיהומים **ברקמה רכה** מצריך **דרגת חשד גבוהה** כי לא תמיד יתבטא עורית אלא יכול להתבטא **כחום ורגישות** ברקמה רכה בלבד

- הגנה בפני זיהומים **תלויה בשלמות העור** ובמחסום המכאני שמספק ה- stratum corneum מאחר **והאפידרמיס אינו מכיל כלי דם**

- **חדירת פתוגנים** תתכן מזקיקי שערה, המערכת הלימפטית, פגיעה בשלמות העור, מחלות עור, ניתוחים וכיבים

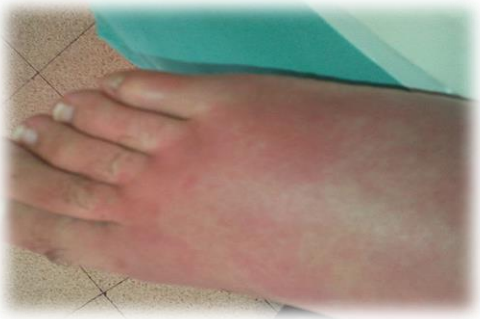


צלוליטיס

- **צלוליטיס-** דלקת עור או **דלקת רקמה תת-עורית** היא דלקת אקוטית של רקמות החיבור התת-עוריות

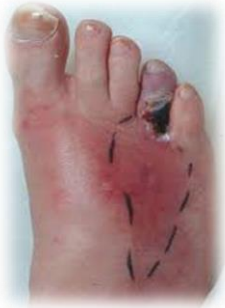
- צלוליטיס נגרמת לרוב על ידי שני מזהמים שכיחים; ***Staphylococcus aureus***, או ***Streptococcus pyogenes***

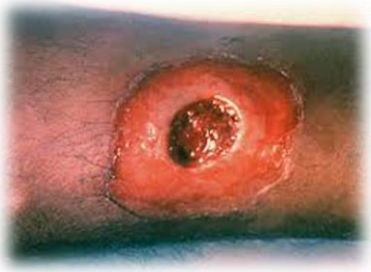
- המזהם חודר את שכבת העור דרך פתח שיכול להיגרם מטראומה, חתכים מקומיים, שפשופים, שריטות או ניתוחים שם הוא משחרר את הרעלנים שלו. יכול להיגרם גם עקב **נשיכת בעלי חיים או עקיצה** על ידי סוגים מסוימים של חרקים ועכבישים שיכולים להעביר חיידקים



תסמינים

- האזור המודלק יהיה אדום, נפוח, רגיש, כואב וחם
- בד"כ גם כולל גם **סימנים סיסטמיים** כגון חום, צמרמורות, ברדיקרדיה, לחץ דם נמוך, כאבי ראש והזעה
- האזורים האדמומיים נוטים להתפשט עם הזמן
- בשכיחות מועטה יותר נוטות להופיע שלפוחיות על האזור וכן נקודות אדומות על האזורים של האדמומיות, הפרשה מוגלתית או שקופה מהאזור הנגוע
- בספירת דם תהיה עלייה של תאי דם לבנים בעיקר מסוג נויטרופילים (סטייה שמאלה) left shift/ neutrophilia





אבחנה

- **האבחנה היא קלינית**, כלומר על סמך התסמינים האופייניים שרואים במהלך בדיקה גופנית

- כאשר עולה החשש שלא רק העור זוהם אלא גם העצם (Osteomyelitis) ניתן לבדוק זאת באמצעות צילום רנטגן או מיפוי עצמות

- במקרים קשים או חריגים לוקחים תרביות: מנסים לגדל במעבדה את החיידק שגרם לזיהום ולזהותו

- ניתן לקחת תרבית מפצע פתוח או מהפרשה שמפריש העור הנגוע

- מנבדקים שסובלים **מחום ומצמרמורת** ניתן לקחת בדיקת דם לתרבית

Microbiology

- Most common pathogens are **beta-hemolytic Strep** and **Staph aureus**, including **MSSA**, **MRSA**

- **Gram-negative aerobic bacilli** are identified in a minority of cases/ **H. influenza** (,בילדים אחרי סינוסיטיס Otitis media)

- **Pseudomonas aeruginoasa** (סוכרת, מדוכאי חיסון, דריכה על מסמר)

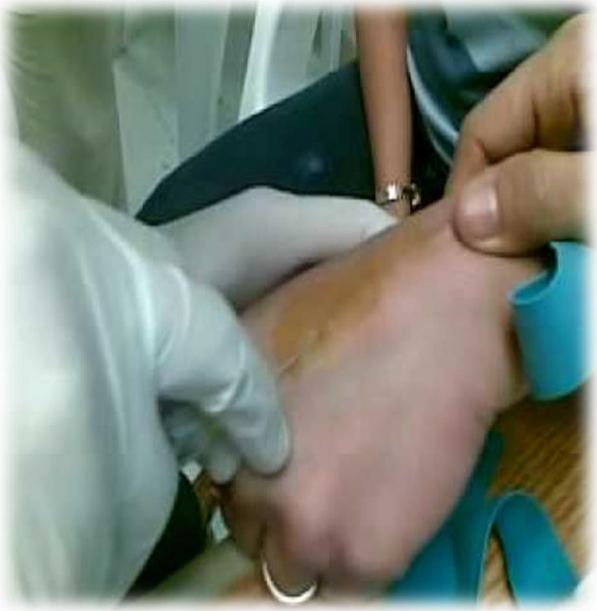
Parenteral versus Oral therapy/ Treatment Requiring Hospitalization

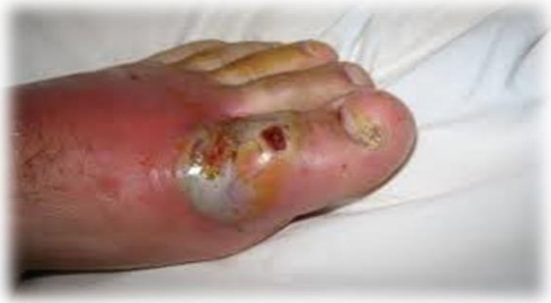
- **Systemic signs of toxicity** (fever >38°C, hypotension, or sustained tachycardia)
- **Rapid progression of erythema**
- **Progression of clinical findings after 48 hours** of oral antibiotic therapy
- **Inability to tolerate oral therapy**

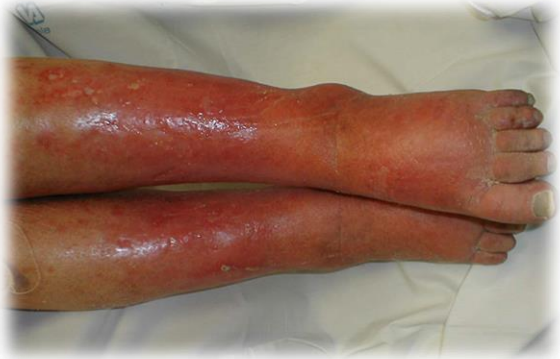
- The presence of an **immunocompromising** condition (such as neutropenia, recent organ transplant, advanced HIV infection, B-cell or T-cell deficiency, or use of immunosuppressive agents) should **lower the threshold for parenteral therapy**

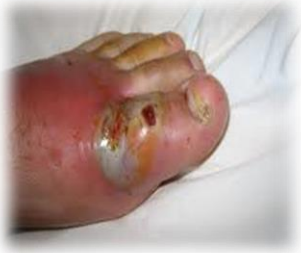
Treatment

- Antibiotic selection for treatment **depends on** whether presentation consists of **purulent** or **nonpurulent cellulitis**









Treatment: Purulent cellulitis

- Patients with purulent cellulitis (purulent drainage or exudate, in the absence of a drainable abscess) should be managed with empiric therapy for infection due to **MRSA**

- **MRSA** was the dominant organism, isolated from **59%** patients, followed by **MSSA** (**17%**); **beta-hemolytic streptococci** accounted **2.6%**

Treatment: MRSA

- **Options for empiric oral therapy for MRSA:**

  1) **Clindamycin** 300 to 450 mg PO TID
  2) **TMP-SMX** 1-2 DS tab PO BID
  3) **Doxycycline** 100 mg PO BID
  4) **Linezolid** 600 mg PO BID
  5) **Minocycline** 200 mg orally once, then 100 mg BID

- Depends on clinical response but a time course of **5-10 days** is usually appropriate

Treatment: Nonpurulent Cellulitis

- For nonpurulent cellulitis, cover for **beta-hemolytic Strep and MSSA, *Streptococcus pyogenes***

- MRSA coverage is warranted for patients fail initial therapy, signs of systemic illness, recurrent infection in the setting of underlying predisposing conditions, and previous episode of MRSA infection

- **Empiric MRSA coverage** should be used in patients with risk factors for MRSA and in communities with high prevalence of MRSA (recent hospitalization, residence in long term care facility, HD, Diabetes, IV drug use, recent antibiotic therapy, incarceration, HIV)

Treatment: Nonpurulent

- Options for Nonpurulent cellulitis (excluding MRSA)

  1) **Cefazolin** 1-2 gram IV every 8 hours
  2) **Cephalexin** 500 mg PO every 6 hours
  3) **Clindamycin** 300 to 450 mg PO every 6-8 hours
  4) **Augmentin** 1 gram IV every 8 hours/ PO 875 mg X 2

- Depends on clinical response but a time course of **5 days** is usually appropriate.
- (Extension of the duration (up to 14 days) may be warranted in the setting of severe infection and/or slow response to therapy)

Symptomatic improvement

- A deepening of erythema may be observed following initiation of antimicrobial therapy. This may be due to destruction of pathogens that release enzymes increasing local inflammation and should **not be mistaken for therapeutic failure**

- **Symptomatic improvement** within 24 to 48 hours of beginning antimicrobial therapy, although **visible improvement of clinical manifestations** may take up to 72 hours.

- 90 % of patients had improvement in clinical findings and serum **C-reactive protein** concentration **3 days after initiation of antimicrobial therapy**

Treatment: MRSA and Nonpurulent

- Options for empiric oral therapy for beta-hemolytic Strep and MRSA:

  1) **Clindamycin** 300 to 450 mg PO TID

  2) **Amoxicillin** 500 mg PO TID + **TMP-SMX** 1 to 2 DS tabs PO BID

  3) **Amoxicillin** 500 mg orally TID + **Doxycycline** 100 mg orally twice daily

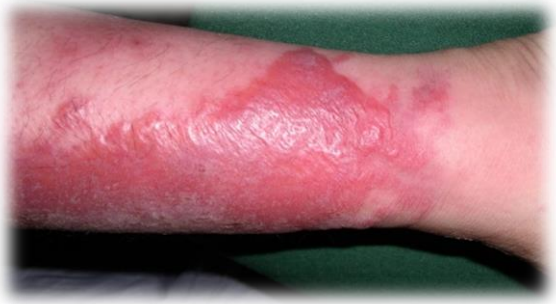
  4) **Linezolid** 600 mg orally BID

- A time course of **5 to 10 days** is usually appropriate

TREATMENT: IV ANTIBIOTICS

- **Vancomycin** is antibiotic of choice for **MRSA** skin infections and for those requiring hospitalization

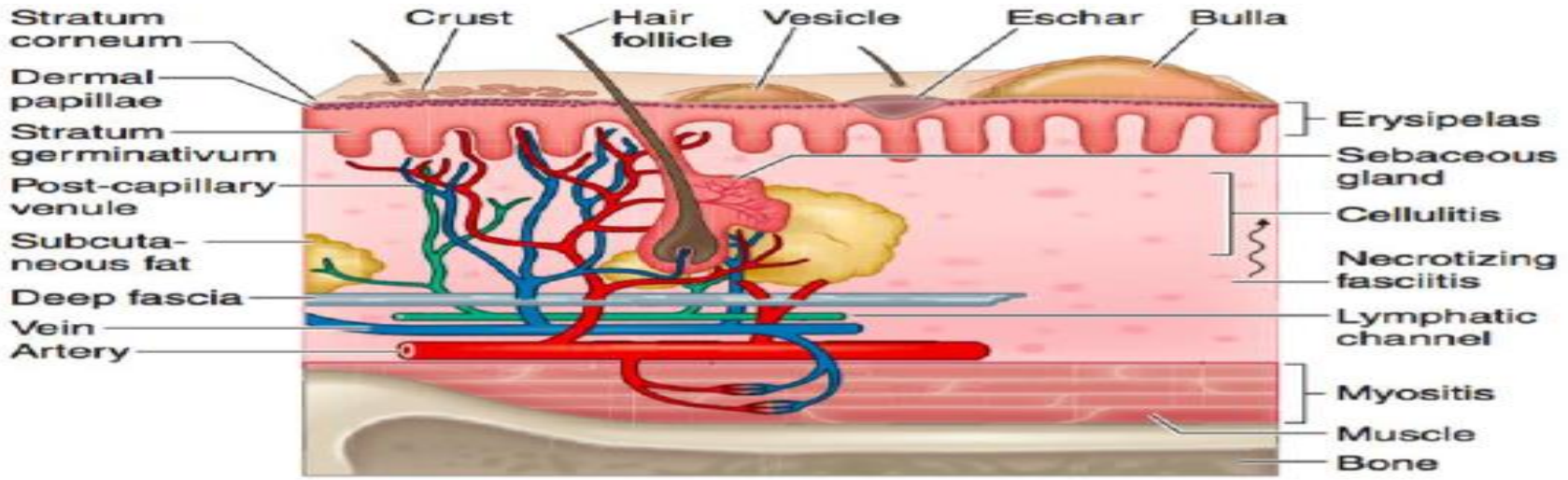
- For those who fail or can't tolerate Vancomycin: **Daptomycin**, **Tigecycline** and **Linezolid** are alternative treatments

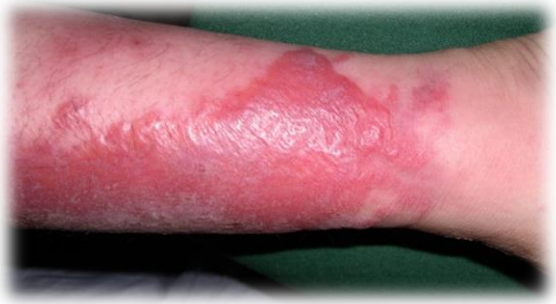


Erysipelas

- **ריזיפלס** הוא זיהום שמתפתח בשכבות העור העליונות, ולכן האזור הנגוע מורם ובעל גבול חד

- **בצלוליטיס** הזיהום הוא בשכבות עמוקות יותר של העור ולכן גבולות האזור הנגוע מטושטשים יותר

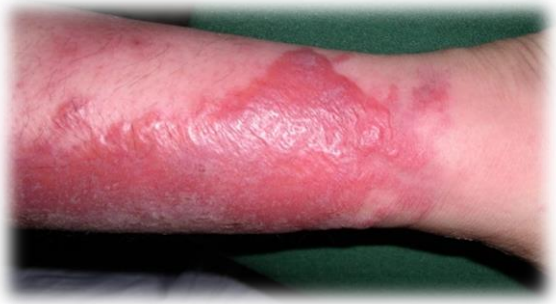




Erysipelas

- **Cefazolin** has activity against streptococci as well as MSSA, which is useful in settings where erysipelas **cannot** be reliably **distinguished** from cellulitis

- **Ceftriaxone** has activity against streptococci (and may be used for activity against MSSA in some circumstances), and its once-daily dosing allows for convenient outpatient administration



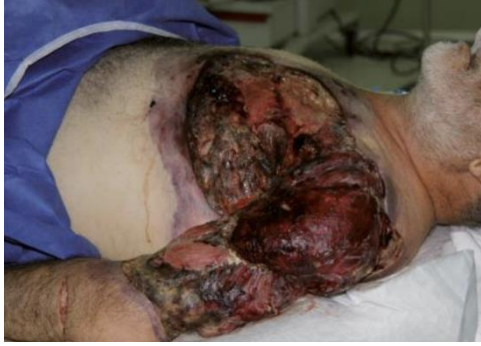
Erysipelas

- Patients with mild infection or those who have improved following initial treatment with parenteral antibiotic therapy may be treated with **oral** penicillin or **amoxicillin**

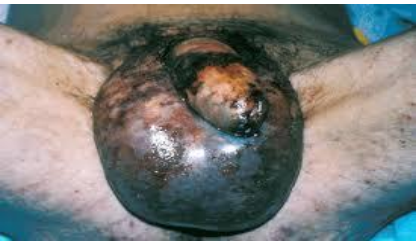
- In the setting of penicillin allergy, cephalexin clindamycin, or linezolid may be used

- The duration of therapy should be individualized depending on clinical response; **5 to 10 days** is usually appropriate

Necrotizing Fasciitis



- זיהום פולשני של רקמות רכות היכול להיגרם על ידי מספר חיידקים:
  - **Strep. Pyogenes**
  - **Group A strep**
  - **חיידקים אנארוביים** כולל **Clostridium**שמקורו לרוב בדגים, ו- **Aeromonas** שמקורו במים או בביוב, ולרוב בעקבות פגיעה בשלמות רירית המעי (תערובת של חיידקים אירוביים ואנארוביים).
- דליפה לתוך האזור הפריאנלי גורמת ל - **Fournier's gangrene** המאופיין בנפיחות מסיבית של שק האשכים ועד כדי התפשטות לדופן הבטן והרגליים.



Necrotizing Fasciitis- Treatment

- **Acceptable empiric antibiotic regimens include :**

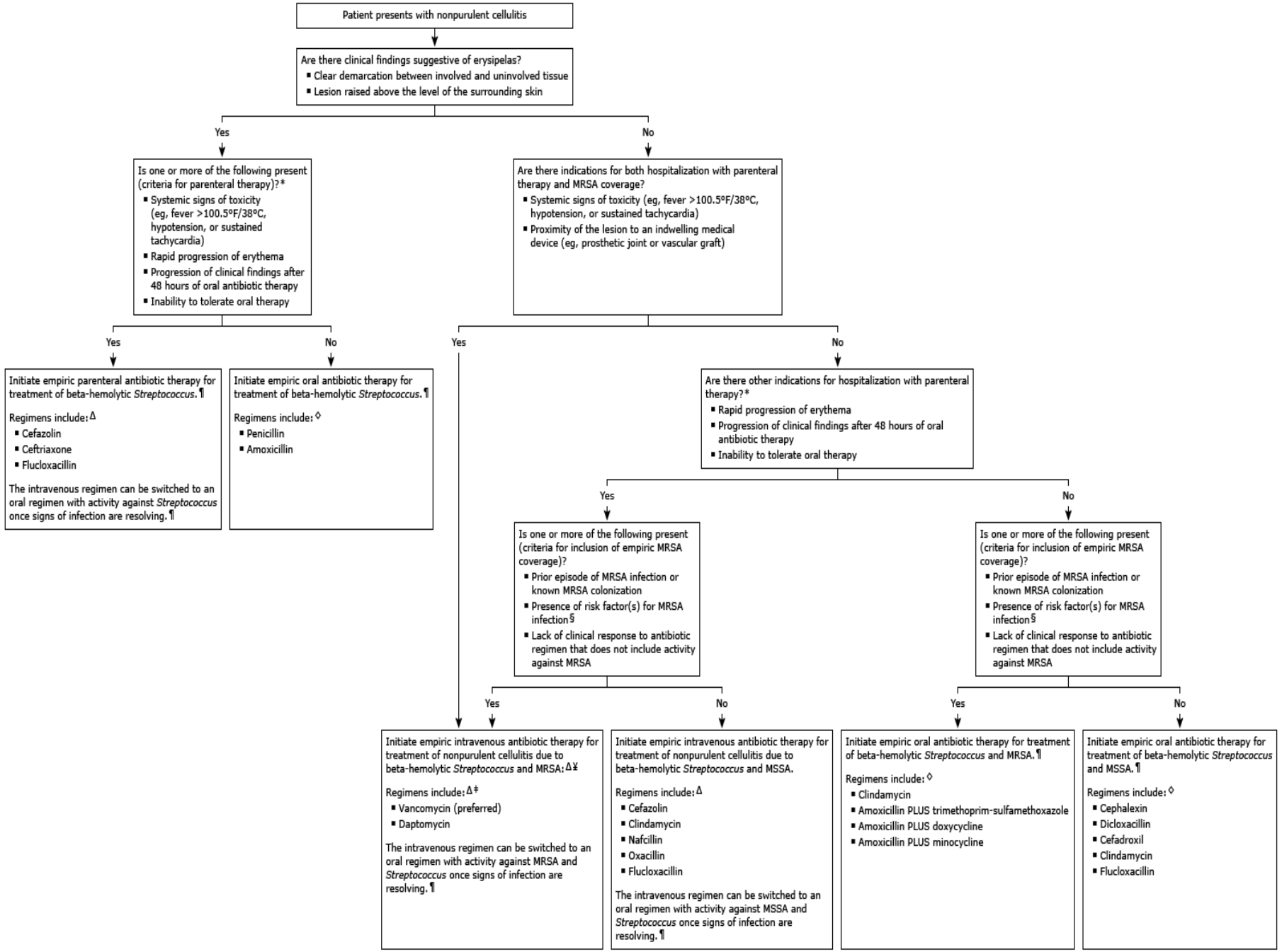
  - A (**Carbapenem)** or (**beta-lactam+beta-lactamase inhibitor)** **plus**

  - An agent with activity against methicillin-resistant *S. aureus* (**MRSA**; such as **Vancomycin** or **Daptomycin**) **plus**

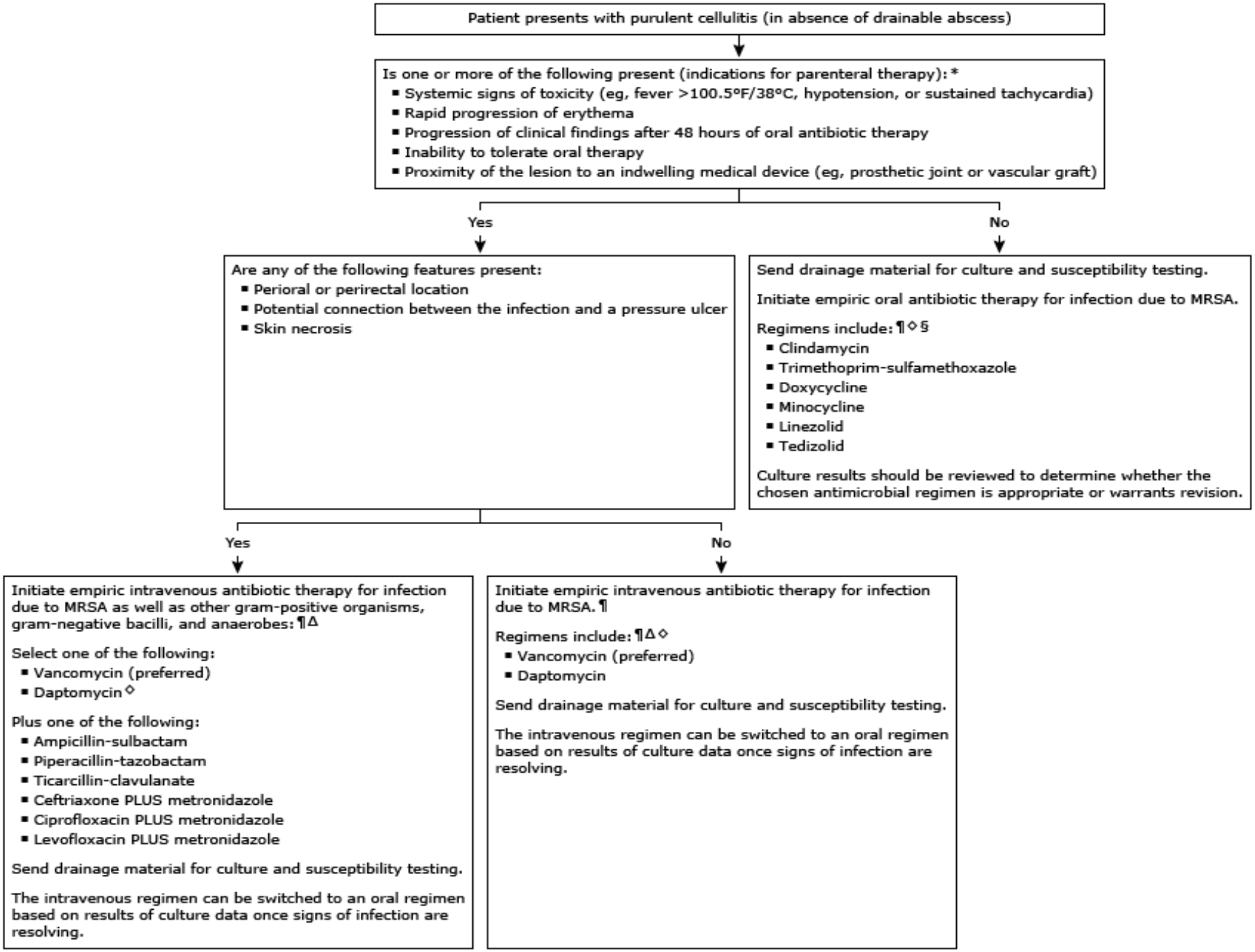
  - **Clindamycin**, for its antitoxin and other effects against toxin-elaborating strains of streptococci and staphylococci (600 to 900 mg intravenously [IV] every eight hours in adults

Patients with hypersensitivity to these agents may be treated either with an **aminoglycoside or a fluoroquinolone, plus metronidazole**.

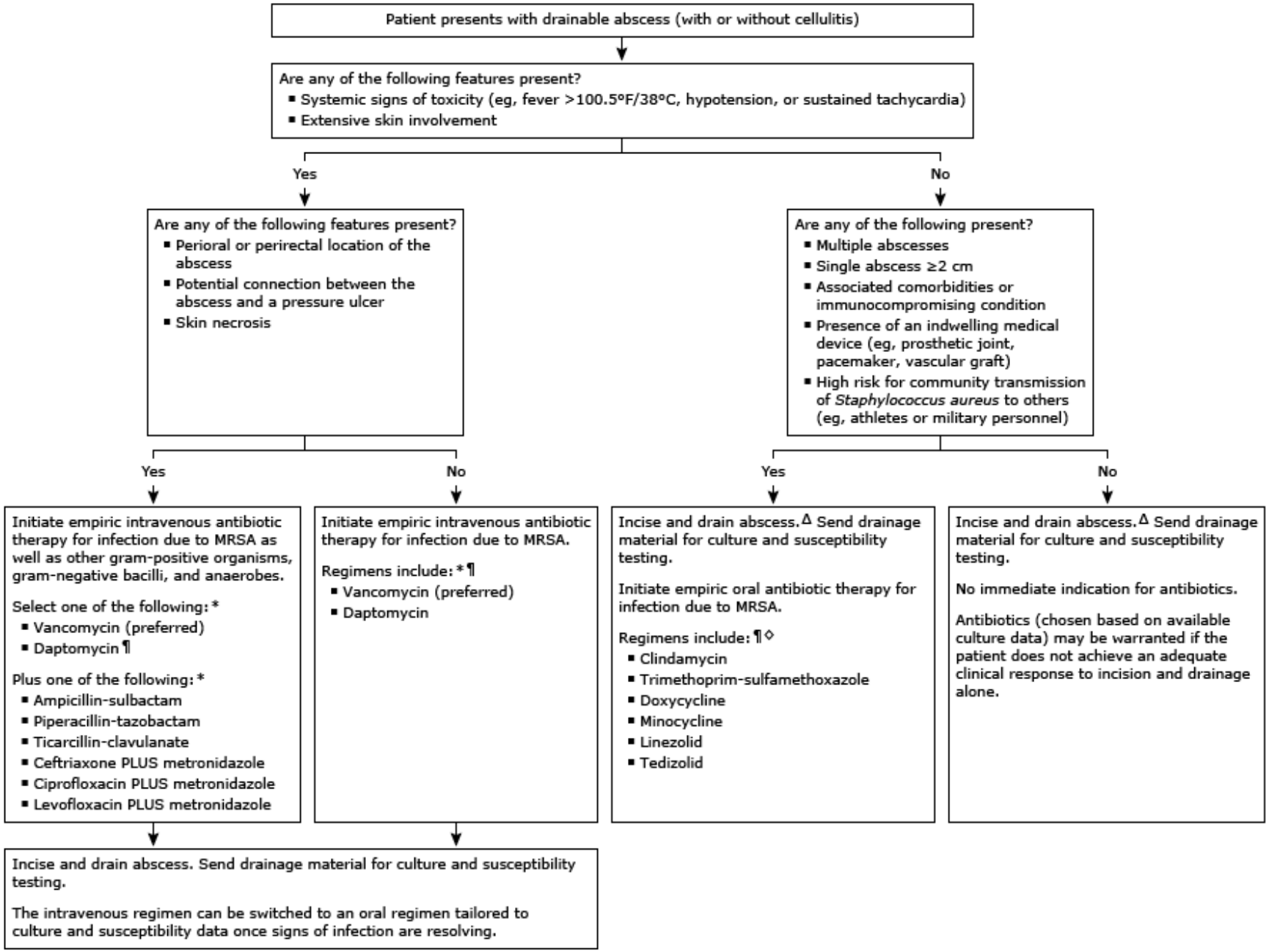
Clinical approach to management of nonpurulent cellulitis in adults



Clinical approach to management of purulent cellulitis (in absence of drainable abscess) in adults



Clinical approach to management of drainable abscess (with or without cellulitis) in adults



Empiric intravenous antibiotic therapy for animal bites

Adults	Children
Options for empiric gram-negative and anaerobic coverage include:	
Monotherapy with a beta-lactam/beta-lactamase inhibitor, such as one of the following:	
Ampicillin-sulbactam 3 g IV every six hours	50 mg/kg per dose (based on ampicillin component) every six hours*
Piperacillin-tazobactam 3.375 g IV every six hours	100 mg/kg per dose (based on piperacillin component) every eight hours*
A third-generation cephalosporin such as ceftriaxone 1 to 2 g IV every 24 hours **PLUS** Metronidazole 500 mg IV every eight hours	A third-generation cephalosporin such as ceftriaxone 100 mg/kg IV daily, given in one to two divided doses* **PLUS** Metronidazole 10 mg/kg IV per dose every eight hours*
Alternative empiric regimens include:	
A fluoroquinolone (eg, ciprofloxacin 400 mg IV every 12 hours, levofloxacin 500 mg IV daily, or moxifloxacin 400 mg IV daily) **PLUS** Metronidazole 500 mg IV every eight hours	Use fluoroquinolones with caution in children <18 years of age; if unable to tolerate other choices: A fluoroquinolone (ciprofloxacin 20 mg/kg IV per dose twice daily or levofloxacin 10 mg/kg IV per dose twice daily if <5 years old or once daily if ≥5 years) **PLUS** Metronidazole 10 mg/kg IV per dose every eight hours
Monotherapy with a carbapenem¶, such as one of the following:	
Imipenem-cilastatin 500 mg every six hours	25 mg/kg per dose every six hours (maximum 500 mg per dose)
Meropenem 1 g every eight hours	20 mg/kg per dose every eight hours (maximum 1 g per dose)
Ertapenem 1 g daily	Children ≤12 years old: 15 mg/kg per dose every 12 hours (maximum 500 mg per dose) Children >12 years old: Refer to adult dosing

Empiric oral antibiotic therapy for animal bites

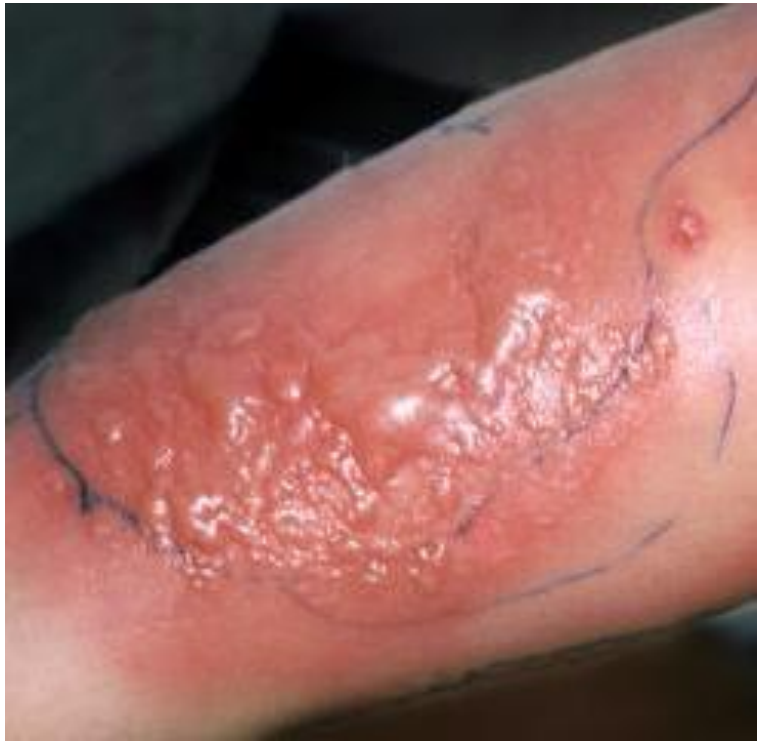
Antibiotic agents	Adults	Children
Agent of choice		
Amoxicillin-clavulanate	875/125 mg twice daily	22.5 mg/kg per dose (amoxicillin component) two times daily (maximum 875 mg amoxicillin and 125 mg clavulanate per dose)*
Alternate empiric regimens include:		
One of the following agents with activity against *P. multocida*:		
Doxycycline¶	100 mg twice daily	<8 years old: Not recommended due to low risk of dental staining ≥8 years old: 2 mg/kg per dose twice daily (maximum 100 mg per dose)
TMP-SMX¶	1 double-strength tablet twice daily	4 to 6 mg/kg (trimethoprim component) per dose twice daily (maximum 160 mg trimethoprim per dose)
Penicillin VK	500 mg four times daily	12.5 mg/kg per dose four times daily (maximum 500 mg per dose)
Cefuroxime	500 mg twice daily	10 mg/kg per dose twice daily (maximum 500 mg per dose)
Levofloxacin	750 mg once daily	Use with caution in children <18 years of age; if unable to tolerate other choices: <5 years old: 10 mg/kg per dose twice daily (maximum 750 mg daily) ≥5 years old: 10 mg/kg per dose once daily (maximum 750 mg mg)
Moxifloxacin	400 mg once daily	Not recommended; insufficient experience
PLUS		
One of the following agents with anaerobic activity:		
Metronidazole	500 mg three times daily	10 mg/kg per dose three times daily (maximum 500 mg per dose)
Clindamycin¶	450 mg three times daily	10 mg/kg per dose three times daily (maximum 450 mg per dose)
The following agents have poor activity against *P. multocida* and should be avoided:		
Cephalexin		
Dicloxacillin		
Erythromycin		

Case presentation

- A 48 year old male with history of HTN, Hyperlipidemia, GERD, CKD on HD ,HTN who presents to your department with complaint of left leg swelling and redness for the past 2-3 days. He states that this has never happened before and that he his worried because it has been worsening. He denies any recent travel. He's also noted some liquid draining from the area as well

Case presentation

- His left leg is seen on the below image:



Case presentation

- **What should your next step be**:

a) Tell him to raise his leg to help with swelling
b) Get an outpatient ultrasound to assess for a blood clot
c) To give him oral Keflex to treat a cellulitis
d) Admit to inpatient medicine for IV antibiotics

Case presentation

- You call the triage resident and notify them that you are directly admitting this patient for parenteral antibiotics.
- **What antibiotic choice is warranted in this patient?**

a) cefazolin

b) vancomycin

c) daptomycin

d) clindamycin

SUMMARY

- Cellulitis manifests as erythema, edema, and warmth
- Diagnosis is based upon clinical manifestations
- Most common causes are beta-hemolytic Strep and Staph aureus
- For non-purulent cellulitis, empiric therapy of beta-hemolytic Strep and MSSA. Patients with non-purulent cellulitis and MRSA risk factors should be covered for beta-hemolytic Strep & MRSA.
- Patients with purulent cellulitis should be managed with empiric therapy for infection due to MRSA.
- For those requiring hospitalization, **Vancomycin is antibiotic of choice** pending culture results.